

INCH-POUND

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SUPERSEDING

MIL-V-7891E

31 December 1990

PERFORMANCE SPECIFICATION

FILLER VALVE, AIRCRAFT OXYGEN

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1 SCOPE

1.1 Scope. This specification covers low pressure and high pressure aircraft oxygen filler valves.

1.2 Classification. The valves and fitting are classified as follows:

M7891LF	-	Low pressure valve (female)
M7891LM	-	Low pressure valve (male)
M7891HM	-	High pressure valve (male)
M7891HF	-	High pressure fitting (female)

Unless otherwise specified, the valves and fittings and their associated plugs, tethers, handles, flanges, and caps are referred to as valves and fittings in this specification.

2 APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are cited in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3 and 4 of this specification, whether or not they are listed.

<p>Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this document should be addressed to: Oklahoma City Air Logistics Center/TICLA, 3001 Staff Drive, Suite 1AE1-101A, Tinker AFB, OK 73145-3036, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.</p>

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2.2 Government documents.

2.2.1 Specifications and standards. The following specifications and standards form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

BB-N-411 - Nitrogen, Technical
 BB-A-1034 - Compressed Air, Breathing

DEPARTMENT OF DEFENSE

MIL-L-25567 - Leak Detection Compound, Oxygen Systems (Metric)

STANDARDS

DEPARTMENT OF DEFENSE

MS33677 - Fitting End, Taper Pipe Thread, Standard Dimensions For
 AN800 - Cone-Union

(Unless otherwise indicated, copies of the above specifications and standards are available from the Defense Automated Printing Service, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoDISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2).

SOCIETY OF AUTOMOTIVE ENGINEERING (SAE)

SAE AS 4395 - Fitting End - Flared Tube Connection, Design Standard
 (DoD-adopted)
 SAE AS 8010 - Aviator's Breathing Oxygen Purity Standard

(Application for copies should be addressed to Society of Automotive Engineering, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

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AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

- ASME B46.1 - Surface Texture (Surface Roughness, Waviness, and Lay)
(DoD-adopted)
- ASME B1.1 - Unified Inch Screw Threads (UN and UNR Thread Form)
(DoD-adopted)

(Application for copies should be addressed to American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, NY 10017-2392.)

AMERICAN NATIONAL STANDARDS INSTITUTE/AMERICAN SOCIETY FOR QUALITY (ANSI/ASQ)

- ANSI/ASQ Z1.4 - Sampling Procedures and Tables for Inspection by Attributes
(DoD-adopted)

(Application for copies should be addressed to American Society for Quality, P.O. Box 3066, Milwaukee, WI 53201-3066, or to the American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus
(DoD-adopted)

(Application for copies should be addressed to American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.)

METALS AND ALLOYS IN THE UNIFIED NUMBERING SYSTEM (UNS)

- UNS C36000 - Free Cutting Brass
- UNS C37700 - Forging Brass
- UNS N04405 - Ni-Cu Alloy Solid Solution Strengthened (Monel R405)

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this documents takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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3 REQUIREMENTS

3.1 Qualification. The valves and fittings furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2 and 6.3).

3.2 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle cost.

3.3 Materials. All materials shall be corrosion resistant or suitably treated to resist corrosion due to electrolytic decomposition, salt air, and any other atmospheric conditions that may be encountered during operational use or storage. All lubricants used shall be compatible with a pure oxygen environment and shall create no health or fire hazards (see 6.8). The use of toxic chemicals, hazardous substances, or ozone depleting chemicals (ODC) shall be avoided, whenever feasible.

3.4 Interface.

3.4.1 Safety-specific materials. All mating surfaces which are exposed to oxygen flow and must resist wear from repetitive coupling and uncoupling, shall be nickel-copper alloy conforming to UNS N04405. Surfaces which are exposed to oxygen flow, but are not mating surfaces, shall conform to UNS C36000, C37700, or N04405. Alternative materials that perform as well as, or better than these materials may be proposed (see 6.4).

3.4.2 Dimensions. The dimensions of low and high pressure filler valves, fittings, handles, and flanges shall conform to figures 1 through 6.

3.4.3 Valve coupling. The M7891LF shall couple with the M7891LM and the M7891HM shall couple with the M7891HF.

3.4.4 M7891LF plug. A plug shall couple into the M7891LF to prevent contamination from entering the valve when not in use (see figure 1). A force of at least 15 pounds shall be required for coupling the plug. Coupling the plug shall not open the M7891LF. The plug shall be uncoupled by rotating the knurled retainer on the M7891LF clockwise between 10° and 45° with a torque not exceeding 25 inch-pounds (in-lb). When coupled and the knurled retainer is not rotated, the plug shall withstand a separation force of at least 15 pounds. The plug shall be tethered to the valve to prevent loss.

3.4.5 M7891LM, M7891HM, and M7891HF caps. A cap shall fit over the M7891LM and M7891HM inlets and the M7891HF outlet to prevent contamination from entering the valves or fitting when not in use (see figures 4, 5, and 6). The cap shall be tethered to the valves and fitting to prevent loss.

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3.5 Environmental conditions.

3.5.1 Temperature. The valves and fittings shall operate between -65° and 165°F.

3.5.2 Vibration. The valves and fittings shall withstand the low frequency and broadband random vibrations (functional and endurance levels) specified in tables III, IV, VI, and VII while pressurized. If no resonant frequencies are found below 30 Hz, the low frequency random vibrations specified in table III and IV are not required.

3.6 Performance.

3.6.1 M7891LM and M7891HM filtration. The M7891LM and M7891HM shall be filtered with a sintered brass 20 micron filter. Alternative filter material that performs as well as, or better than this material may be proposed (see 6.4).

3.6.2 Gas flow.

3.6.2.1 M7891LF and M7891LM. The rate of gas flow through the coupled M7891LF and M7891LM shall be at least 42.5 standard liters per minute (SLPM) with 335 pounds per square inch gage (psig) applied (see 6.5).

3.6.2.2 M7891HM and M7891HF. The rate of gas flow through the coupled M7891HF and the M7891HM shall be at least 42.5 SLPM with 335 pounds per square inch gage (psig) applied.

3.6.3 Leakage.

3.6.3.1 M7891LF coupling and outlet. There shall be no leakage when M7891LF is pressurized to 500 psig and coupled to M7891LM or uncoupled with the plug removed (see 6.13).

3.6.3.2 M7891LM inlet. The inlet leakage shall be no more than 1 standard cubic centimeter per hour (SCC/HR) when 500 psig is applied to the M7891LM outlet.

3.6.3.3 M7891HM inlet. The inlet leakage shall be no more than 1 SCC/HR when 2,200 psig is applied to the M7891HM outlet.

3.6.3.4 M7891HM and M7891HF coupling. There shall be no leakage when M7891HM is coupled to M7891LF and pressurized to 2,200 psig (see 6.13).

3.6.4 Coupling.

3.6.4.1 M7891LF and M7891LM coupling force. A force of at least 15 pounds shall be required to couple the M7891LM into the M7891LF. The M7891LM shall be uncoupled by rotating the knurled retainer on the M7891LF clockwise between 10° and 45° with a torque not exceeding 25 in-lb.

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3.6.4.2 M7891LF and M7891LM coupling endurance. The M7891LF and M7891LM shall withstand 1,000 cycles of coupling and uncoupling. A cycle is defined as the coupling and uncoupling of the M7891LF and M7891LM followed by the coupling and uncoupling of the M7891LF plug and the M7891LF.

3.6.4.3 M7891HM and M7891HF coupling endurance. The M7891HM and M7891HF shall withstand 500 cycles of coupling and uncoupling.

3.6.5 Actuation.

3.6.5.1 M7891LM opening pressure. The opening pressure for the M7891LM shall be 15 pounds per square inch differential (psid) or less (see 6.6).

3.6.5.2 M7891HM opening pressure. The opening pressure for the M7891HM shall be 15 psid or less (see 6.6).

3.6.5.3 M7891LM and M7891HM opening pressure endurance. The M7891LM and M7891HM shall withstand 1,000 cycles of opening pressure.

3.6.6 Oxygen bomb. There shall be no material ignition or deterioration of any of the valves and fittings when subjected to a pure oxygen surge pressure of 2,600 psig for 30 seconds.

3.7 Cleanliness. All surfaces shall be free of visible particulates (50 microns and larger), free of visible fluorinated lubricants, and free of hydrocarbon contamination to a level not greater than 3 milligrams per square foot (mg/ft²)(see 6.7).

3.8 Item identification. The valves and fittings shall be permanently (see 6.15) and legibly marked with the following information (see 6.2).

- a. Manufacturer's identification
- b. Manufacturer's CAGE code
- c. Manufacturer's part number (PN)
- d. Part or Identification Number (PIN)(see 6.16)
- e. Additional identification information

3.9 Interchangeability. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable.

4 VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification (see 4.2).
- b. Conformance (4.3).

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4.2 Qualification inspection. Qualification inspection shall be performed on a minimum of two valves and fittings and shall include all the tests in 4.6.

4.3 Conformance inspection. Conformance inspection shall include the tests in 4.3.1 and 4.3.2.

4.3.1 Individual tests. The valves and fittings shall be subjected to the tests below.

- a. Examination (see 4.6.1).
- b. Leakage (see 4.6.5.1, 4.6.5.2, and 4.6.5.3).

4.3.2 Sample tests. In addition to the tests indicated in 4.3.1, the valves and fittings shall be sampled in accordance with ANSI/ASQ Z1.4 at the inspection level (normal, tightened, or reduced) in the acquisition document (see 6.2 and 6.9). The sample of valves and fittings shall be subjected to the following tests.

- a. Dimensions (see 4.6.2).
- b. Gas flow (see 4.6.4).
- c. Coupled and uncoupled (see 4.6.6).

4.4 Inspection condition.

4.4.1 Temperature and pressure. Unless otherwise specified in the individual test descriptions, tests shall be conducted at ambient temperature and pressure.

4.4.2 Test medium. The gas used for testing shall be oxygen conforming to SAE AS 8010, Type I. Unless otherwise specified in the individual test descriptions, compressed air conforming to BB-A-1034 Grade A or C or nitrogen conforming to BB-N-411, type I, Class I, Grade B may be used.

4.5 Requirements cross-reference matrix. Table I provides a cross-reference matrix of the section 3 requirements tested or verified in the paragraphs below.

TABLE I. Requirements cross-reference matrix

Requirements	Verification	Requirements	Verification
3.1	4.2	3.6.3.2	4.6.5.2
3.3	4.6.1, 4.6.11	3.6.3.3	4.6.5.3
3.4.1	4.6.1, 4.6.10	3.6.3.4	4.6.5.4
3.4.2	4.6.2	3.6.4.1	4.6.6.1
3.4.3	4.6.1, 4.6.6.1	3.6.4.2	4.6.6.2
3.4.4	4.6.1, 4.6.6.1	3.6.4.3	4.6.6.3
3.4.5	4.6.1	3.6.5.1	4.6.7.1
3.5.1	4.6.8	3.6.5.2	4.6.7.2
3.5.2	4.6.9	3.6.5.3	4.6.7.3
3.6.1	4.6.1	3.6.6	4.6.10

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TABLE I. Requirements cross-reference matrix (continued)

Requirements	Verification	Requirements	Verification
3.6.2.1	4.6.4.1	3.7	4.6.1, 4.6.3
3.6.2.2	4.6.4.2	3.8	4.6.1
3.6.3.1	4.6.5.1	3.9	4.6.1

4.6 Tests.

4.6.1 Examination. The valves and fittings shall be examined for compliance with the requirements for materials, interface (less dimensions), cleanliness, filter, interchangeability, and item identification (see 6.2 and 6.11).

4.6.2 Dimensions. The valves and fittings shall be examined for compliance with the requirements for dimensions (see figures 1 through 6).

4.6.3 Cleanliness. All surfaces shall be free of visible particulates (50 microns and larger), free of visible fluorinated lubricants, and free of hydrocarbon contamination to a level not greater than 3 mg/ft² (see 6.7). Cleanliness of the surfaces shall be demonstrated by industrially accepted methods and these cleaning and verification methods shall be identified (see 6.2 and 6.7).

4.6.4 Gas flow.

4.6.4.1 M7891LF and M7891LM. The M7891LF shall be coupled to the M7891LM with the outlet end of the M7891LM open. A flow of gas at a pressure of 335 psig shall be applied to the inlet of the M7891LF for a minimum of one minute. The rate of flow from the M7891LM outlet shall be at least 42.5 SLPM.

4.6.4.2 M7891HM and M7891HF. The M7891HM shall be coupled to the M7891HF with the outlet end of the M7891HM open. A flow of gas at a pressure of 335 psig shall be applied to the inlet of the M7891LF for a minimum of one minute. The rate of flow from the M7891HM outlet shall be at least 42.5 SLPM.

4.6.5 Leakage.

4.6.5.1 M7891LF coupling and outlet. With the outlet capped, the M7891LM shall be coupled to the M7891LF and pressurized to a minimum of 500 psig. With the pressure maintained, the valves shall be submerged in water for at least 2 minutes. There shall be no breakaway of bubbles after 1 minute (see 6.10). The M7891LM shall be removed and the M7891LF (plug removed) shall be repressurized and submerged for at least 2 minutes. There shall be no breakaway of bubbles after 1 minute.

4.6.5.2 M7891LM inlet. The M7891LM outlet shall be pressurized to 50 psig and held for 1 minute. Next, the pressure shall be increased to a minimum of 500 psig and held for 1 minute. The leakage from the valve inlet shall be 1 SCC/HR or less.

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4.6.5.3 M7891HM inlet. The M7891HM outlet shall be pressurized to 50 psig and held for 1 minute. Next, the pressure shall be increased to a minimum of 2,200 psig. The leakage from the valve inlet shall be 1 SCC/HR or less.

4.6.5.4 M7891HM and M7891HF coupling. With the outlet capped, the M7891HM shall be coupled to the M7891HF and pressurized to a minimum of 2,200 psig. With the pressure maintained, the valves shall be submerged in water for at least 2 minutes. There shall be no breakaway of bubbles after 1 minute (see 6.10).

4.6.6 Coupling.

4.6.6.1 M7891LF and M7891LM coupling force. The M7891LM shall be coupled into the M7891LF. The knurled retainer of the M7891LF shall be rotated clockwise and the M7891LM uncoupled. This procedure shall be repeated with the M7891LF plug. The force required to couple the valve and plug and to resist removal of the plug without rotating the knurled retainer shall be at least 15 pounds. The maximum torque required to rotate the knurled ring clockwise between 10° and 45° shall be 25 in-lb.

4.6.6.2 M7891LF and M7891LM coupling endurance. The M7891LF and M7891LM shall withstand 1,000 cycles of coupling and uncoupling. A force of at least 15 pounds shall be applied to ensure complete coupling of the valves and plug. After 1,000 cycles, the valves shall be subjected to tests in 4.6.5.1 and 4.6.6.1.

4.6.6.3 M7891HM and M7891HF coupling endurance. The M7891HF and M7891HM shall withstand 500 cycles of coupling and uncoupling. A torque of at least 40 in-lb (hand tight) shall be applied to ensure complete coupling of the valves and fitting. After 500 cycles, the valves shall be subjected to test in 4.6.5.4.

4.6.7 Actuation.

4.6.7.1 M7891LM opening pressure. With the M7891LM outlet pressure maintained at ambient, the inlet pressure shall be increased until opening occurs (see 6.6). The applied inlet pressure shall be no greater than 15 psid higher than the outlet pressure. This test shall be repeated with outlet pressures of 200 and 500 psig.

4.6.7.2 M7891HM opening pressure. With the M7891HM outlet pressure maintained at ambient, the inlet pressure shall be increased until opening occurs (see 6.6). The applied inlet pressure shall be no greater than 15 psid higher than the outlet pressure. This test shall be repeated with outlet pressures of 500 and 2,200 psig.

4.6.7.3 M7891LM and M7891HM opening pressure endurance. A pressure of 500 and 2,200 psig shall be applied to the inlets of the M7891LM and M7891HM, respectively causing the valves to open and gas to flow. The pressure shall then be released from the valve inlets closing the valves and completing a cycle. This operation shall be repeated for at least 1000 cycles. After completing the cycling, the valves shall be subjected to the tests in 4.6.5.2 and 4.6.5.3.

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4.6.8 Temperature exposure and operation.

4.6.8.1 M7891LF and M7891LM low temperature operation. With a minimum pressure of 500 psig applied to the M7891LF, the M7891LF and M7891LM shall be exposed to a temperature of $-65 \pm 5^\circ\text{F}$ for 4 hours. During this period, M7891LM shall be coupled to M7891LF six times at equal intervals. The M7891LM shall open and gas flow shall occur. After each complete disconnection, the M7891LF shall be checked for leaks by applying leak detection compound conforming to MIL-L-25567 and the M7891LM shall be checked for leakage by applying 500 psig to the M7891LM outlet. The M7891LF shall not leak and the leakage through the M7891LM shall be 1 SCC/HR or less. After the low temperature operation and when the temperature of the M7891LF and M7891LM have stabilized at local ambient temperature, the valves shall be subjected to the tests in 4.6.5.1 and 4.6.5.2.

4.6.8.2 M7891LF and M7891LM high temperature exposure and operation. The test in 4.6.8.1 shall be repeated using an exposure temperature of $165 \pm 5^\circ\text{F}$ for 24 hours.

4.6.8.3 M7891HM and M7891HF low temperature operation. The M7891HM shall be coupled to the M7891HF and then exposed to a temperature of $-65 \pm 5^\circ\text{F}$ for 4 hours. During this period, M7891HM inlet shall be pressurized to 2,200 psig six times at equal intervals through the M7891HF. The M7891HM shall open and gas flow shall occur. After each pressurization, the pressure to the valve inlet shall be removed and the M7891HM shall be checked for leakage by applying 2,200 psig to the valve outlet. The leakage from the valve inlet shall be 1 SCC/HR or less. After the low temperature operation and when the temperature of the valve has stabilized at local ambient temperature, the valve shall be subjected to the test in 4.6.5.3.

4.6.8.4 M7891HM and M7891HF high temperature exposure and operation. The test in 4.6.8.3 shall be repeated using an exposure temperature of $165 \pm 5^\circ\text{F}$ for 24 hours.

4.6.9 Vibration. The valve shall be subjected to the resonance search in 4.6.9.1 followed by the low frequency and broadband random vibration tests as specified in 4.6.9.2 and 4.6.9.3. The plug or cap shall be installed on the valve and shall not come lose during these tests. At completion of these tests, the valve shall be subjected to the tests in 4.6.5 and 4.6.6.1.

4.6.9.1 Resonance search. The resonant frequencies of each axis of the valve shall be determined at the frequencies and levels specified in table II. Resonant frequency is defined as the frequency where the response to input ratio is 2:1 or greater. If no resonant frequencies are found below 30 Hz, the test in 4.6.9.2 is not required.

TABLE II. Resonance search

Frequency (Hz)	Displacement in double amplitude (inch) and acceleration (g), if applicable
5 - 14	0.05
14 - 2000	0.080 to 0.067 at $\pm 0.5g$

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4.6.9.2 Low frequency random vibration tests. Each axis of the valve shall be subjected to the low frequency random vibration tests, functional and endurance level, as specified in tables III and IV. The functional level shall be applied for one hour followed by the endurance level for 2.5 hours. At the completion of the endurance level, the functional level shall be reapplied for one hour. During these tests, the valve shall be pressurized as specified in table V. The inlet leakage shall not exceed the rate given in table V during the functional level, but these rates may be exceeded during the endurance level.

TABLE III. Low frequency random vibration test, functional level

Frequency (Hz)	Power spectral density
0.1 - 0.3	+6 dB/oct.
0.3 - 4	0.132 g ² /Hz
4 - 11	-14.5 dB/oct.
11 - 15	0.001 g ² /Hz
Tolerances: +3/-1.5 dB	

TABLE IV. Low frequency random vibration test, endurance level

Frequency (Hz)	Power spectral density
0.1 - 0.3	+6 dB/oct.
0.3 - 4	0.596 g ² /Hz
4 - 11	-14.8 dB/oct.
11 - 15	0.004 g ² /Hz
Tolerances: +3/-1.5 dB	

TABLE V. Valve performance specifications

PIN	Test pressure	Acceptable inlet leakage at functional level only
M7891LF	500 psig	None (see 6.13)
M7891LM	500 psig	1 cm ³ /h
M7891HM	2,200 psig	1 cm ³ /h

4.6.9.3 Broadband random vibration tests. Each axis of the valve shall be subjected to the broadband random vibration tests, functional and endurance level, as specified in tables VI and VII. The functional level shall be applied for one hour followed by the endurance level for 2.5 hours. At the completion of the endurance level, the functional level shall be reapplied for one hour. During the functional and endurance levels, the valve shall be pressurized as specified in table V. The inlet leakage shall not exceed the rate given in table V during the functional level, but that rate may be exceeded during the endurance level.

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TABLE VI. Broadband random vibration test, functional level

Frequency (Hz)	Power spectral density
15 - 22.5	+3 dB/oct.
22.5 - 239.4	0.06 g ² /Hz
239.4 - 300	+4 dB/oct.
300 - 1,000	0.081 g ² /Hz
1,000 - 2,000	-6 dB/oct.
Tolerances: +3/-1.5 dB from 15 to 500 Hz ±3 dB from 500 to 2,000 Hz	

TABLE VII. Broadband random vibration test, endurance level

Frequency (Hz)	Power spectral density
15 - 22.5	+3 dB/oct.
22.5 - 281	0.095 g ² /Hz
281 - 300	+3.27 dB/oct.
300 - 1,000	0.103 g ² /Hz
1,000 - 2,000	-6 dB/oct.
Tolerances: +3/-1.5 dB from 15 to 500 Hz ±3 dB from 500 to 2,000 Hz	

4.6.10 Oxygen bomb.

4.6.10.1 Oxygen bomb test setup. The test setup used in performing the bomb tests shall be capable of delivering a pressure shock of oxygen as specified to the valve being tested. A pressure shock shall consist of a minimum surge pressure of 2,600 psig being delivered in 20 ± 7 milliseconds, held for 10 seconds, and then released and returned to ambient where it is held for a minimum of 3 seconds before the next shock pulse. The time between pressure shocks shall be 30 seconds. The pressure shocks shall be delivered through a 0.190 to 0.198 inch inside diameter (ID) tube approximately 40 inches long. Oxygen conforming to SAE AS 8010, Type I, and preheated to $140^\circ \pm 5^\circ\text{F}$ shall be used.

4.6.10.2 M7891LF oxygen bomb test. The M7891LF inlet (0.312 outside diameter tube fitting) shall be installed on the test setup at the end of the 0.190 to 0.198 inch ID tubing using an adapter. With the plug assembly removed from the outlet end of the valve, the valve shall be pressure shocked 60 times and show no indication of internal or external material charring or deterioration.

4.6.10.3 M7891LM oxygen bomb test. Repeat the setup procedure for the M7891LF per 4.6.10.2. Seal the outlet (0.44-20 UNJF or 0.25-18 NPT) of the M7891LM against a minimum pressure of 2,600 psig. The outlet seal shall relieve pressure in the M7891LM back to ambient

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between pressure shocks. With the M7891LM coupled to the M7891LF on the test setup, the valves shall be pressure shocked 60 times and show no indication of internal or external material charring or deterioration.

4.6.10.4 M7891HM oxygen bomb test. The M7891HF inlet shall be installed on the test setup at the end of the 0.190 to 0.198 inch ID tubing with an adapter. The M7891HM outlet (0.38-24 UNJF or 0.13-27 NPT) shall be sealed against a minimum pressure of 2,600 psig. The outlet seal shall relieve pressure in the M7891HM back to ambient between pressure shocks. With the M7891HM coupled to the M7891HF on the test setup, the valves shall be shocked 60 times and show no indication of internal or external material charring or deterioration.

4.6.11 Corrosion. Each valve and fitting, with the inlet and outlet plugged, shall be subjected to a salt fog test specified in ASTM B117 for 50 hours. The valve then shall be examined for external corrosion and subjected to the test in 4.6.5 (see 6.11).

4.6.12 Disassembly and examination. At the conclusion of all the tests, each valve shall be disassembled and examined. The valve shall show no evidence of deterioration or wear.

5 PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department or Defense Agency automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

5.2 Oxygen clean. The packaging of the valves and fittings shall be conducted in such a way as to maintain the verified cleanliness levels during transport and storage (see 6.14).

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The filler valves are intended for use in recharging aircraft high pressure or low pressure gaseous oxygen systems or portable oxygen equipment.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Classification (see 1.2).
- c. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2).

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- d. When additional item identification is required (see 3.8).
- e. Inspection level (normal, tightened, or reduced) for sampling (see 4.3.2).
- f. The requirement for the vendor to identify proposed cleaning and verification methods (see 4.6.3).
- g. Packaging requirements (see 5).

6.3 Qualification. The attention of the contractors is called to the requirements with respect to products requiring qualification. Awards will be made only for products which are, at the time of award of contract, qualified for inclusion in the Qualified Products List (QPL No. 7891) whether or not such products have actually been listed by that date. In order that the manufacturers may be eligible to be awarded contracts or purchase orders for the products covered by this specification, they are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification. Information pertaining to qualification of products may be obtained from Oklahoma City Air Logistics Center/TICLA, 3001 Staff Drive, Suite 1AE1-101A, Tinker AFB, Oklahoma 73145-3036.

6.4 Safety-specific materials. Monel and brass have been specified because they do not support combustion in the presence of pressurized pure oxygen. If ignition does occur for any reason, the parent material will not burn. Monel is a harder material than brass and is required in areas where wear will occur to prevent fire and safety hazards in the form of oxygen leaks. These materials establish minimum requirements. However, alternative materials that meet or exceed these requirements may be proposed at the time of application for qualification inspection.

6.5 SLPM. One SLPM is equal to one liter of flow per one minute at a pressure of 760 millimeters of mercury at the temperature of 0° Celsius.

6.6 Opening pressure. Opening pressure is the difference in the applied inlet pressure and the outlet pressure when the valve opens (cracks) and gas flows through the valve.

6.7 Cleaning. See MIL-STD-1330 and MIL-STD-1359 for guidance on proven cleaning methods and verifications. Visible inspections are typically conducted using white light and ultraviolet light to detect particulates and some types of hydrocarbons. The non-volatile residue test in MIL-STD-1359 may be used to baseline the hydrocarbon verification at an acceptable contamination level, however, other cleaning and verification methods that do not contain class I and II ODC solvents should be used for production.

6.8 Lubrication. MIL-L-60326 and MIL-G-27617 are proven lubricants designed for use in valves and oxygen equipment. The use of other lubricants in a pure oxygen environment will increase the probability of fire.

6.9 Sampling. Previous procurements have typically used lot and sample sizes as shown in table VIII.

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TABLE VIII. Sampling guidance

Lot size	Sample size
1-25	2
26-150	3
151-1200	5

6.10 Breakaway of bubbles. The breakaway of bubbles is the formation and breaking away of bubbles on the surface of a submerged test valve while applying internal pressure. The formation of bubbles is acceptable but breaking away is not.

6.11 Materials. Material certification has been used to demonstrate compliance with the safety-specific and corrosion requirements.

6.12 Oxygen bomb. ASTM G74 may be used for guidance on test setup and safety concerns.

6.13 No leakage. No leakage is defined as no loss of gas bubbles as specified in 4.6.5.1.

6.14 Packaging for oxygen clean parts. Double bagging is one method of packaging oxygen clean parts. This method consists of an oxygen clean part being placed in a clean plastic bag and sealed. The bagged part is then placed in a second plastic bag with an oxygen clean tag. The second bag is then sealed.

6.15 Permanently marked. The valve marking system should withstand standard oxygen cleaning and handling processes.

6.16 Part or identifying number (PIN). The PIN to be used for valves acquired to this specification are created as follows:

<u>M</u>	<u>7891</u>	<u>XX</u>	<u>-X</u>
Prefix for military specification	Specification number	Class (see 1.2)	Dash number (see figures 1-6)

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6.17 Supersession data. For supersession data see table IX.

TABLE IX. Supersession data

New PIN	Old part number
M7891LF-1	AN6024-4
M7891LF-2	AN6024-5
M7891LF-3	AN6024-6
M7891LF-4	AN6024-7
M7891LF-5	AN6024-8
M7891LF-6	AN6024-9
M7891LM-1	AN6027-3
M7891LM-2	AN6027-4
M7891HM-1	MS22066-3
M7891HM-3	MS22066-1

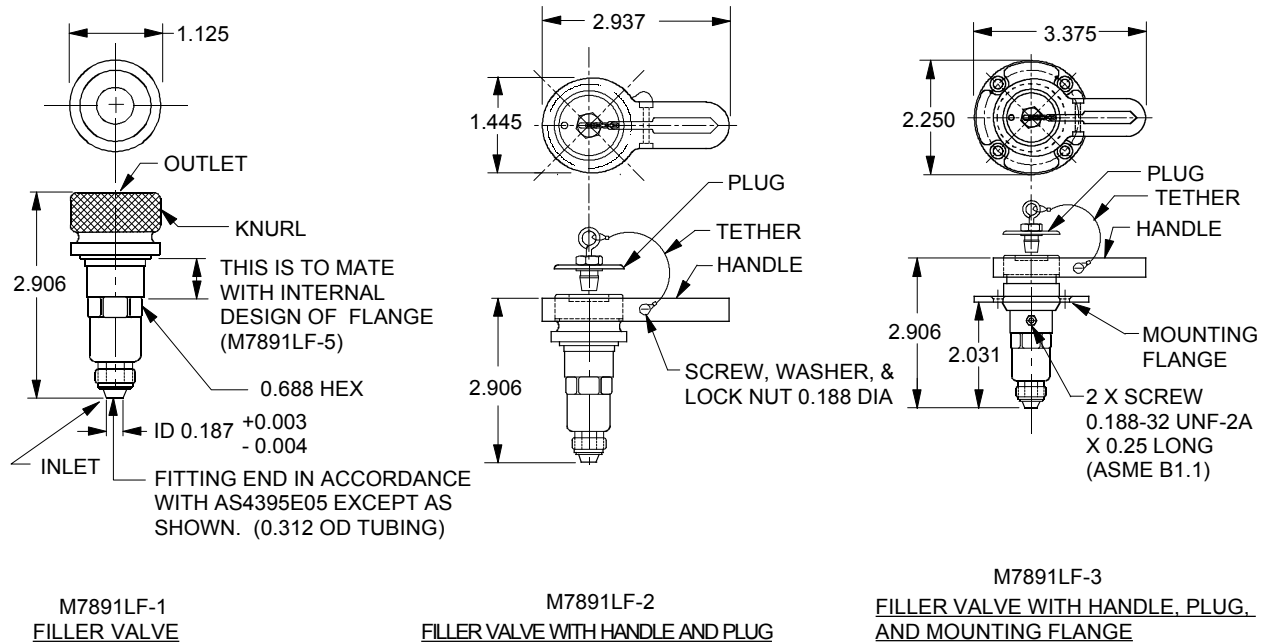
6.18 Subject term (key word) listing.

Cap
Charging
Coupling
Filter
Gas
Plug

6.19 International standardization agreements. Certain provisions of this specification, M7891LM and M7891LF, are the subject of international standardization agreement ASCC Air Standard 25/34A. When amendment, revision, or cancellation of this specification is proposed which will modify the international agreement concerned, the preparing activity will take appropriate action through international standardization channels including departmental standardization offices, to change the agreement or make other appropriate accommodations.

6.20 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

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PIN	ITEM	SUPERSEDING
M7891LF-1	BASIC VALVE	AN 6024-4
M7891LF-2	FILLER VALVE WITH HANDLE, PLUG, & TETHER	AN 6024-5
M7891LF-3	FILLER VALVE WITH HANDLE, FLANGE, PLUG, & TETHER	AN 6024-6
M7891LF-4	HANDLE	AN 6024-7
M7891LF-5	FLANGE	AN 6024-8
M7891LF-6	PLUG & TETHER	AN 6024-9

NOTE: 1. UNLESS OTHERWISE SPECIFIED, MAXIMUM ROUGHNESS SHALL BE $\sqrt{63}$ IN ACCORDANCE WITH ASME B46.1.

2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES: DECIMALS ± 0.010
 ANGLES $\pm 1^\circ$

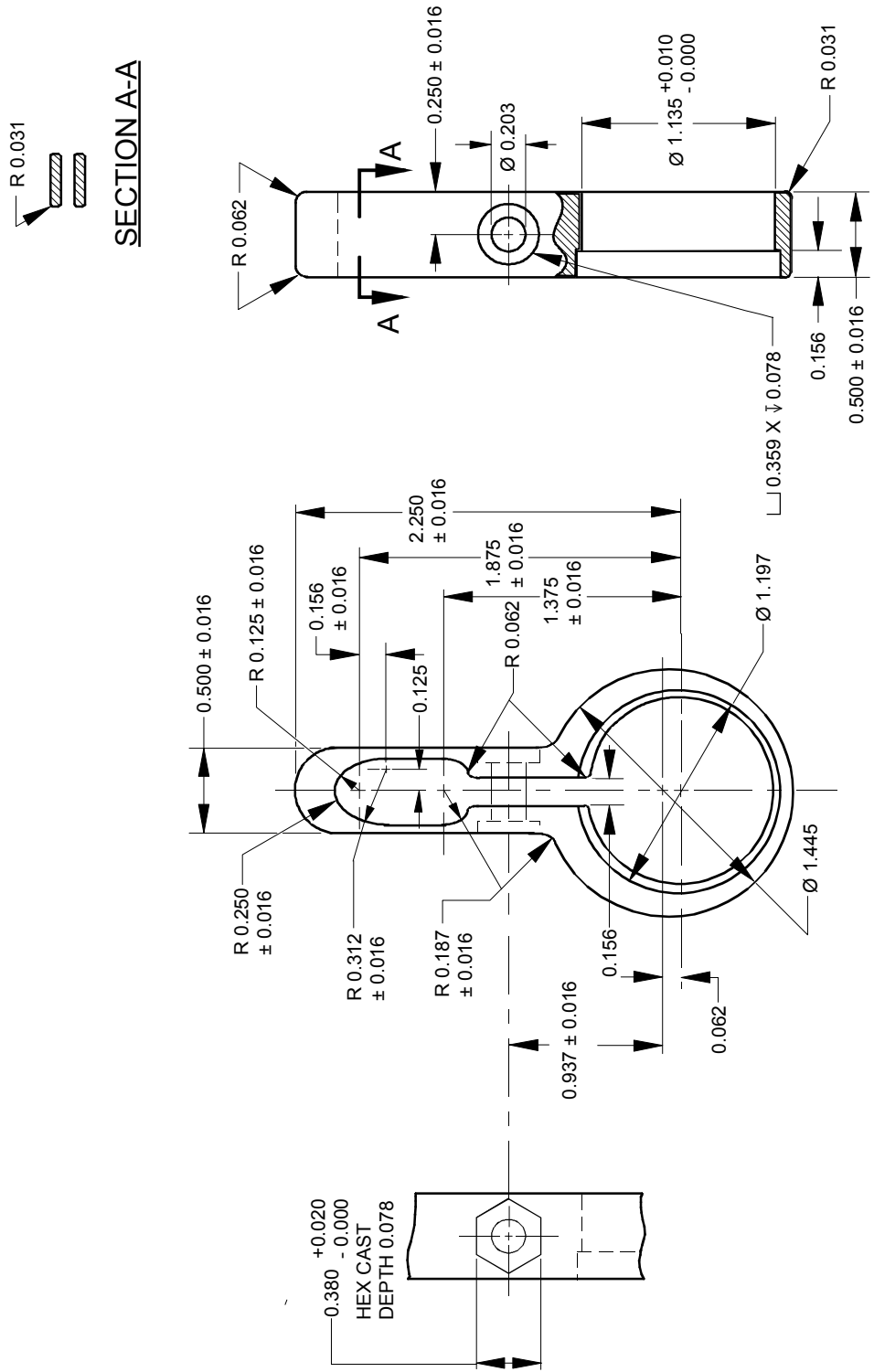
3. THIS FILLER VALVE IS DESIGNED FOR USE WITH M7891LM VALVE.

4. FIGURE NOT TO SCALE.

5. THIS FILLER VALVE IS SUBJECT OF INTERNATIONAL STANDARDIZATION AGREEMENT ASCC AIR STD 25/34A.

FIGURE 1. M7891LF valves

MIL-PRF-7891F



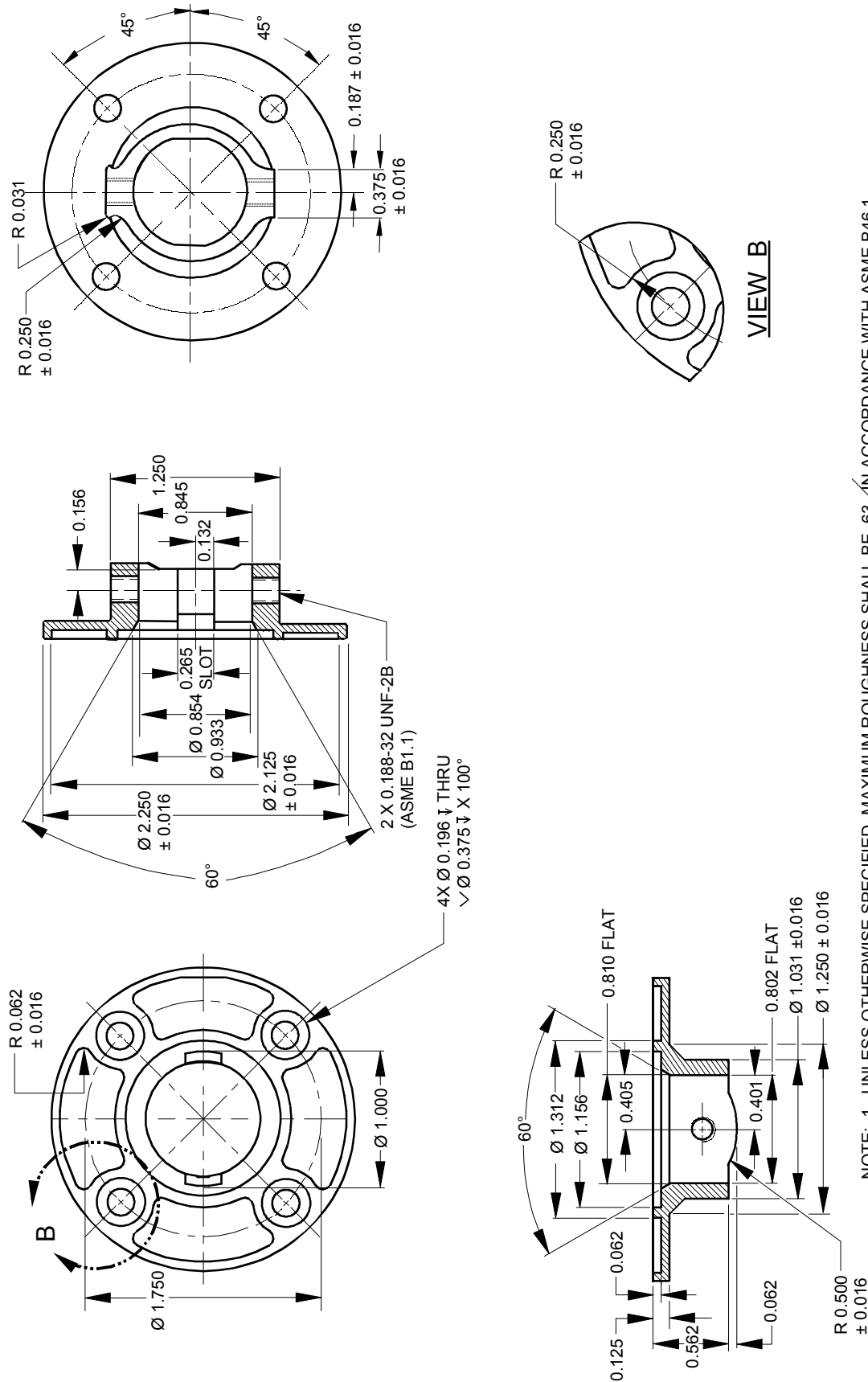
NOTE: 1. UNLESS OTHERWISE SPECIFIED, MAXIMUM ROUGHNESS SHALL BE $\sqrt{63}$ IN ACCORDANCE WITH ASME B46.1.

2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES: DECIMALS ± 0.010 ANGLES $\pm 1^\circ$

3. FIGURE NOT TO SCALE.

FIGURE 2. M7891LF-4 handle

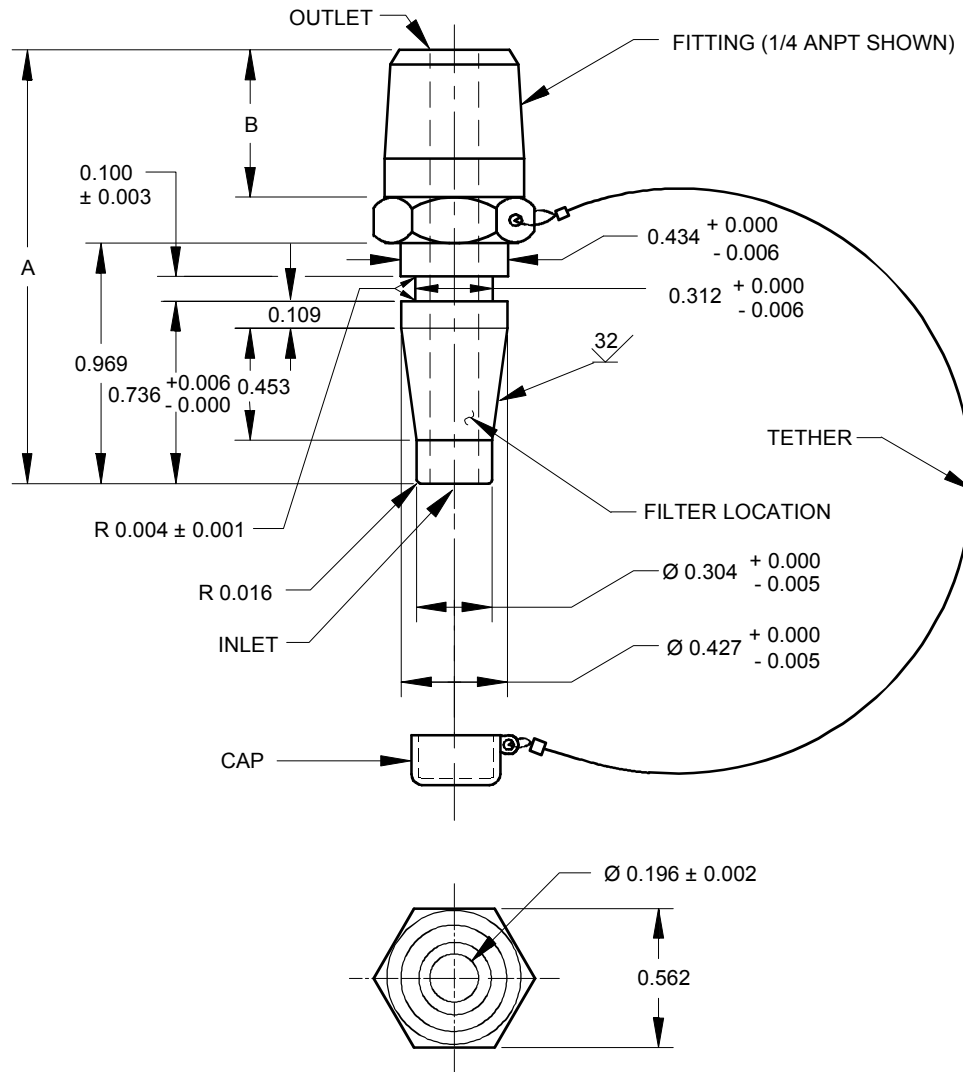
MIL-PRF-7891F



- NOTE: 1. UNLESS OTHERWISE SPECIFIED, MAXIMUM ROUGHNESS SHALL BE $\sqrt{63}$ IN ACCORDANCE WITH ASME B46.1.
 2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES: DECIMALS ± 0.010 ANGLES $\pm 1^\circ$
 3. FIGURE NOT TO SCALE.

FIGURE 3M7891LF-flange

MIL-PRF-7891F

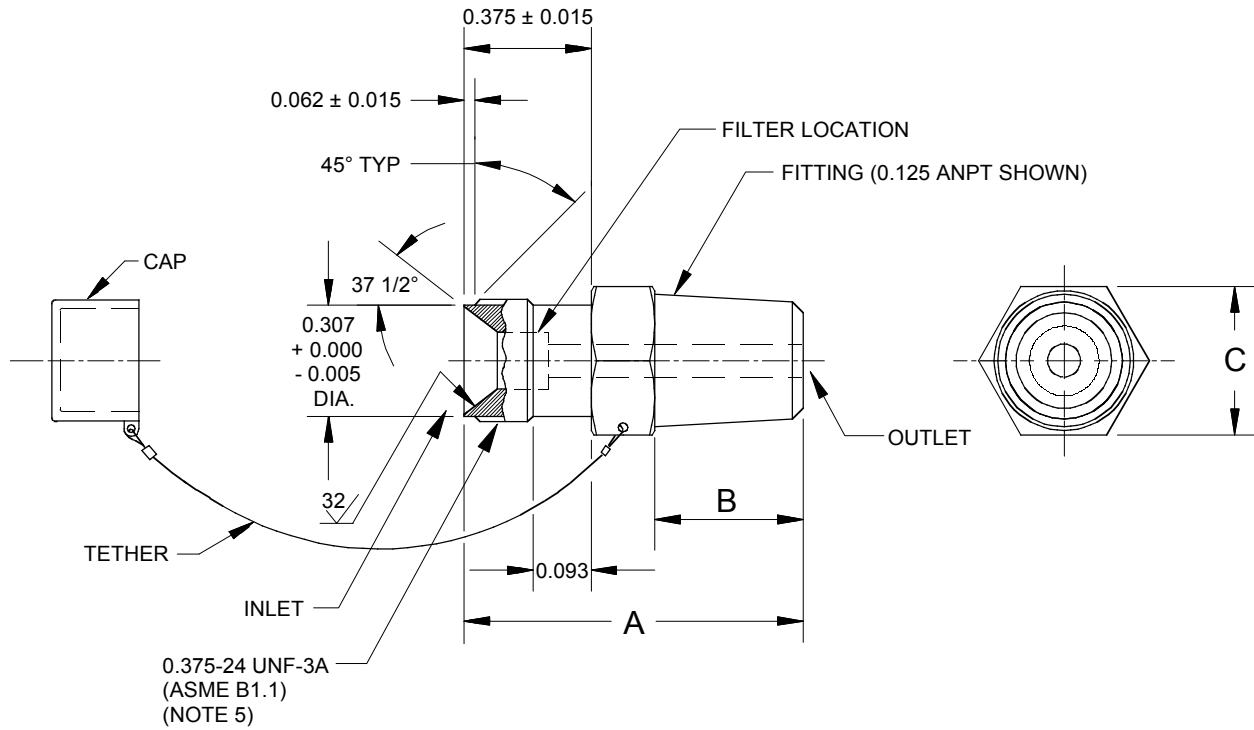


PIN	FITTING	SIZE	A ±.005	B	ITEM	SUPERSEDING
M7891LM-1	MS33677	1/4-18	1.775	0.594	VALVE, CAP, & TETHER	AN6027-3
M7891LM-2	AS4395E04	0.438-20 UNJF-3A	1.731	0.550	VALVE, CAP, & TETHER	AN6027-4
M7891LM-3	-	-	-	-	CAP & TETHER	-

- NOTES: 1. UNLESS OTHERWISE SPECIFIED, MAXIMUM ROUGHNESS SHALL BE $\sqrt{63}$ IN ACCORDANCE WITH ASME B46.1.
2. DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES ± 0.010 .
3. THIS VALVE IS DESIGNED FOR USE WITH M7891LF FILLER VALVE.
4. FIGURE NOT TO SCALE.
5. THIS FILLER VALVE IS SUBJECT OF INTERNATIONAL STANDARDIZATION AGREEMENT ASCC AIR STD 25/34A.

FIGURE 4. M7891LM valve

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PIN	FITTING	SIZE	A	B	C	ITEM	SUPERSEDING
M7891HM-1	MS33677	0.125-27	1.000	0.391	0.437	VALVE, CAP, & TETHER	MS22066-3
M7891HM-2	AS4395E03	0.375-24-UNJF-3A	1.090	0.479	0.625	VALVE, CAP, & TETHER	-
M7891HM-3	-	-	-	-	-	CAP & TETHER	MS22066-2

NOTES: 1. UNLESS OTHERWISE SPECIFIED, MAXIMUM SURFACE ROUGHNESS SHALL BE $125 \sqrt{\text{in}}$ ACCORDING TO ASME B46.1.

2. DIMENSION IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES: DECIMALS ± 0.005
 ANGLES $\pm 0.5^\circ$

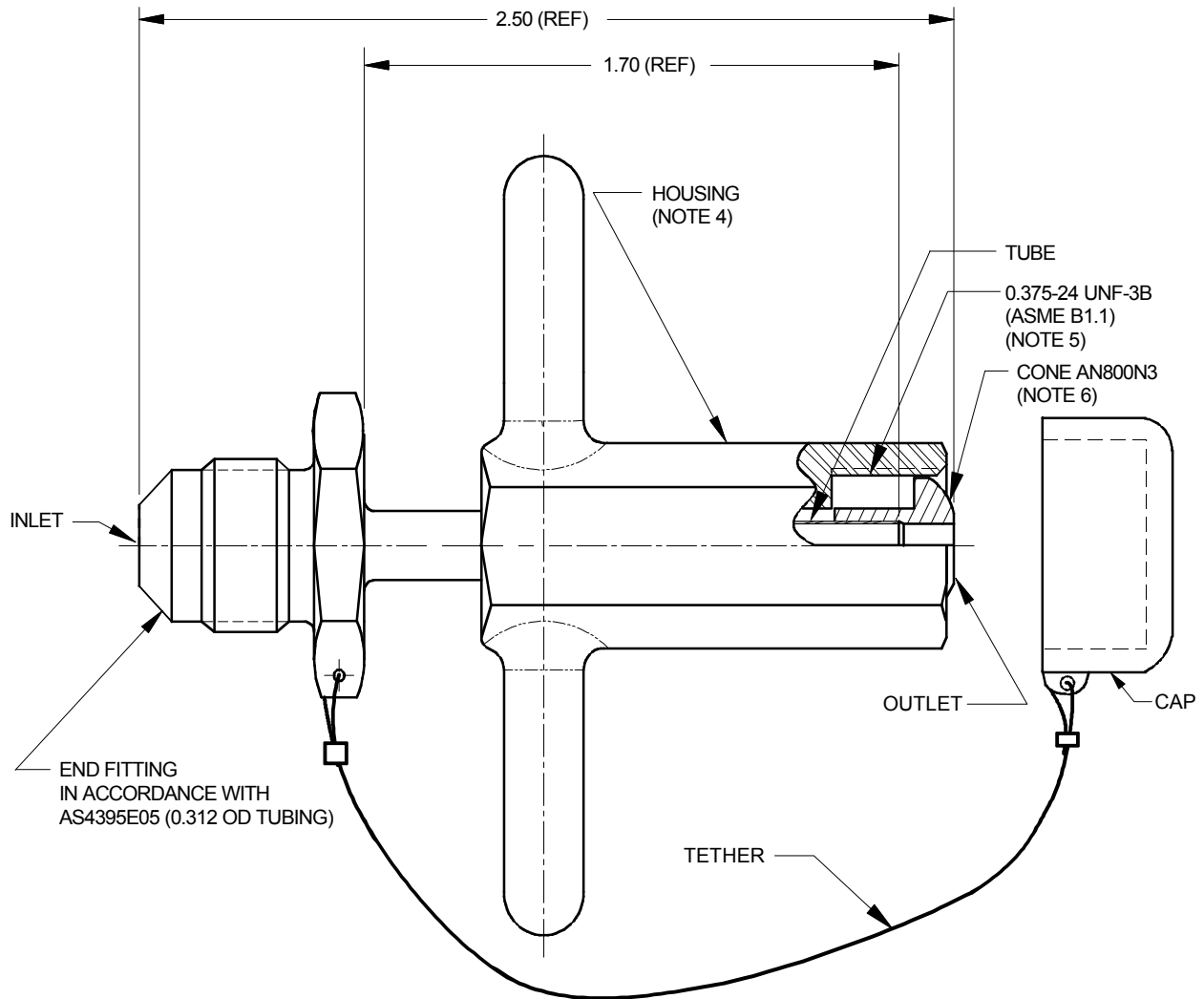
3. THIS VALVE IS DESIGNED TO BE USED WITH M7891HF FITTING.

4. FIGURE NOT TO SCALE.

5. MAXIMUM THREAD SURFACE ROUGHNESS SHALL BE $63 \sqrt{\text{in}}$ ACCORDING TO ASME B46.1.

FIGURE 5. M7891HM valve and cap

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PIN	ITEM
M7891HF-1	FITTING, CAP, & TETHER
M7891HF-2	CAP & TETHER

NOTES: 1. UNLESS OTHERWISE SPECIFIED, MAXIMUM SURFACE ROUGHNESS SHALL BE $\sqrt{125}$ ACCORDING TO ASME B46.1.

2. THIS VALVE IS DESIGNED TO BE USED WITH M7891HM FITTING.

3. FIGURE NOT TO SCALE.

4. HOUSING ROTATES AROUND TUBE, CONE, AND, END FITTING ASSEMBLY.

5. MAXIMUM THREAD SURFACE ROUGHNESS SHALL BE $\sqrt{63}$ ACCORDING TO ASME B46.1.

6. AN800-3 (BRASS) CONE MAY BE USED IN PLACE OF AN800N3 (M0NEL) CONE.

FIGURE 6. M7891HF fitting

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Custodians:

Air Force - 99

Navy - AS

Army - AV

Preparing activity:

Air Force - 71

Project 1660-0797

Review activity:

DLA - CS

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

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2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.
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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-PRF-7891F	2. DOCUMENT DATE (YYMMDD) 97/12/22
3. DOCUMENT TITLE FILLER VALVE, AIRCRAFT OXYGEN		
4. NATURE OF CHANGE <i>(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)</i>		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME <i>(Last, First, Middle Initial)</i>	b. ORGANIZATION	
c. ADDRESS <i>(include Zip Code)</i>	d. TELEPHONE <i>(Include Area Code)</i> (1) Commercial	e. DATE SUBMITTED (YYMMDD)
	(2) AUTOVON <i>(If applicable)</i>	
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c. ADDRESS <i>(Include Zip Code)</i> 3001 STAFF DR 1AE1-101A TINKER AFB, OK 73145-3036	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	